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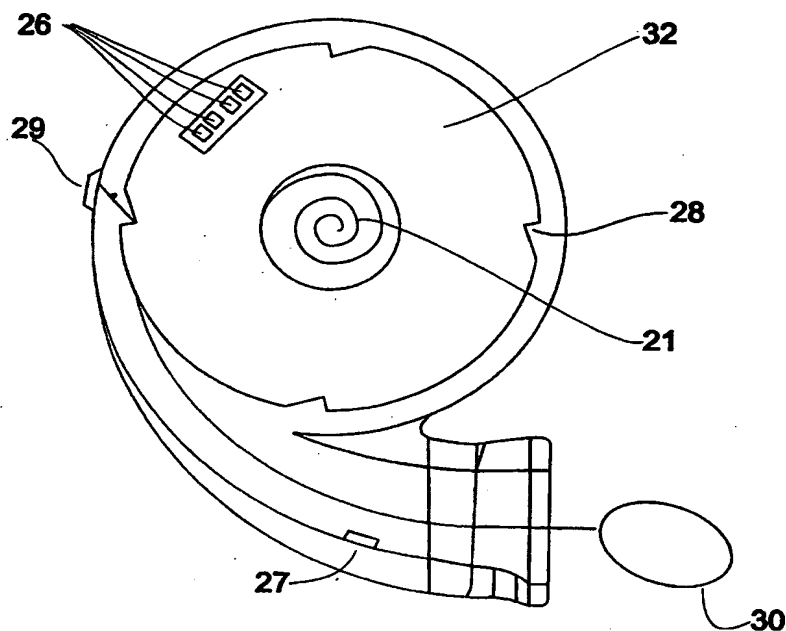
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(54) Title: CABLE TIDY



(57) Abstract: A receptacle or cable tidy which accommodates cable connecting audio equipment to earphones and/or microphone also has switch means for activating the earphones and/or microphone and/or equipment, in particular when cable is pulled out of the receptacle. The receptacle can be integral with the equipment or physically attachable to it.

WO 01/06739 A1

Cable tidy

This invention is concerned with a cable tidy – that is to say, a device for enabling a cable (or lead) between a mobile electronic equipment such as a mobile phone and a headset incorporating a microphone and speaker to be extended from a storage position associated with the device to a use position, and then to be neatly retracted back to the storage position.

For many years telephones had a separate handset -first just a speaker, but then both a speaker and a microphone - that was connected to the main base unit by a flexible lead. More recently, however, and particularly with the advent of mobile phones, the speaker, microphone and base unit are a one-piece object, and in operation the whole unit is held close to the user's head, extending generally from ear to mouth. The equipment is neat and tidy, and its use is very convenient, but there is increasing concern that holding the unit, which, during operation, emits microwave radiation, close to the user's head may in some way cause damage to the user's tissues (and especially the brain, which is thought to be especially sensitive to microwave radiation).

It has been suggested, then, that one way round this problem would be to revert to the "old-fashioned" idea of a separate handset - microphone and speaker -spaced from but operatively connected to the microwave emitting base unit; the latter could then be carried, safely distanced from the head, in a pocket or pouch (at the waist, say), while the handset was utilised when actually using the phone. It is well known for other types of small electronic units - for instance, personal stereos, tape players and CD players, and hand-held dictating machines - to work satisfactorily like this, with a base unit to which is operatively connected a speaker (an earpiece, or earphone) and if appropriate a microphone. However, the problem with such a connection as currently suggested is that the lead is necessarily quite long, and not only has a marked tendency to get in the way when not in use but can all too easily knot. As a result,

significant damage often occurs to the lead/ cable, earpiece, microphone and connector, and this has resulted in people rejecting this type of arrangement.

A number of tidies or devices for storing headphone cable for personal stereo and similar devices have been described in publications. An example of one such device is described in GB Patent Number 2328580A, which discloses an annular case which holds an annular bobbin. The cable is wound round the bobbin and can be withdrawn from the case and retracted into the case. The cable and case are attached to the personal stereo device through a jack plug on the end of the cable, which plugs into a corresponding audio outlet socket on the personal stereo, and the case is provided with a recess in which the earpiece can be lodged when the cable is fully retracted. GB 2261869 discloses a similar device. GB2320990 discloses a mobile phone arrangement in which the mobile phone is mounted in a cradle carrier to be carried by the user, and the cradle carrier also carries an elastic cable leading to a headset for use with the mobile phone.

These devices do not address some problems encountered by users of personal headsets attached to equipment such as personal stereos or mobile phones, such as that, when the user extends the cable for the headset, in order to use it, the user wishes to be able readily to operate the device at essentially the same time.

For example, such equipment may be subject to physical shocks and forces which may result in inadvertent operation of the equipment and often the controls for such equipment, in particular to activate external headsets and/or to power the device, are not conveniently located.

The present invention proposes a remarkably simple, yet surprisingly effective solution to these problems, by suggesting that the lead should be stored in, and movable out of and drivably into, a chamber associated with the base unit, so that it can be pulled out when the equipment is to be used, and then taken back in, out of the way, when the equipment is not required. More specifically, the invention provides a storage unit that can in some appropriate way be both physically and operatively linked to the main body of the equipment (for an electronic unit such as a mobile phone or personal stereo) to allow the equipment to work, with the equipment's

speaker and/or microphone operatively connected to the storage unit, and thus through to the equipment, by a lead that can be stored in a chamber in the storage unit and is associated with means to allow it to be pulled out for use and then withdrawn/retracted back inside after that use is completed. The invention is designed to be a semi permanent or permanent integration with a piece of mobile communication equipment, in that it allows use of the equipment with or without the cable, speaker and microphone, without the removal of the storage and cable unit, either physically or functionally.

In one aspect, therefore, the invention provides, a receptacle for accommodating cable, such as a chambered storage unit, or tidy, for use with an item of electrical or electronic equipment, in particular portable electronic or electrical audio equipment, having acoustic transducers such as a microphone and/or a speaker, which is physically and operatively linkable to the main body of the equipment, with the equipment's speaker and/or microphone operatively connectable thereto through the storage unit by a cable, or lead, storable in the chamber and associated with means to allow it to be pulled out for use and then withdrawn/retracted back inside after that use is completed, and includes switch means associated with the receptacle for controlling the interaction of the audio with the headphones or other acoustic transducers. Preferably the invention provides a cable receptacle for accommodating electrical cable linking one or more personal acoustic transducers to portable electronic audio equipment electrically connectable through the cable to such transducers in which the receptacle is physically secured or adapted to be physically secured to the audio equipment, and in which the receptacle is designed so as to permit withdrawal of the cable from and drivable retraction of the cable into the receptacle, characterised in that the receptacle also comprises switch means for controlling the interaction of the audio equipment with the acoustic transducers this can permit switching between normal and hands-free use.

The invention is designed to be a semi permanent or permanent integration with a piece of equipment, in that it allows use of the equipment with or without the cable, speaker and microphone, without the removal of the cable receptacle, either physically or functionally.

In this context personal electronic transducers are intended to mean devices such as microphones or headphones, earpieces or loudspeakers which are of the sort designed to use in close proximity to the user, usually a single user. Examples of such transducers are the button shaped earpieces are often used by users of personal stereos and fit inside the users ear, some of which are further described later in the description. The receptacle or tidy, or storage unit, of the invention is for use with an item of portable electronic audio equipment, such as equipment which produces an audio signal or receives an audio signal and in particular the sort of equipment which is designed to be carried, in particular carried regularly on or close to the person, for example electrical or electronic equipment having a microphone (a sound input transducer) and/or a speaker (a sound output transducer). Such equipment includes mobile phones, dictation machines, and personal stereo, tape or CD players; the first two employ both earpieces (as speakers) and microphones, while the latter only have earphones. The physical form of these transducers can vary quite considerably - though all are connected by leads to the main body of the equipment, and so all can benefit from the invention. Earpieces, for example, can be either a simple earplug (earphone) that fits into the ear or they can be one or two small pad-like speaker devices each mounted outside but adjacent and pressed onto the ear on a strap support (usually of springy metal) that passes over and around the user's head (the whole is usually referred to as "headphones"). Combinations of microphone and earpieces can be completely separate physically, but preferably they are much like a conventional telephone handset or, for hands-free operation (as is presently much favoured), they are like headphones but with the microphone on a separate arm (or boom) also carried by the strap or with the microphone mounted on the cable leading to the earpieces so that, in use, it is located generally close to the user's mouth.

The receptacle or tidy of the invention may be a chambered storage unit which is physically linkable or adapted to be secured to the main body of the equipment. Most preferably the storage unit is in essence a separate suitably-sized and -shaped box, or similar container, with a suitable opening through which the lead can pass, within which box the lead can be stored. The box can be physically mounted on the equipment in any convenient way (but preferably utilising some reasonably secure plug/socket insertion arrangement that will prevent accidental disengagement), so as

in effect to become a part thereof. For example, the box could be housed within a specially-modified phone carrying case, the phone sliding into the connector to the box as it is secured within the case. Alternatively, the box could be housed within its own case, which latter is then detachably attached to the phone, or to the phone's carrying case, by the connector and by some other physical means such as studs, poppers or VELCRO (RTM). Another possibility is for the box to be housed within a car-phone holder, the box then being attached to the phone both via the connector and the holder. However, notionally the unit could be designed and constructed not as a separate, attachable part but instead as an integral part of the equipment.

The actual size of the box - and thus of the chamber within the box - is whatever is necessary satisfactorily to hold the cable in the form in which it is within the tidy upon retraction, while the shape of the box is generally whatever will pleasingly match that of the equipment to which the unit is to be linked. Using the preferred retraction means (a constant tension spring, as discussed hereinafter) the cable wraps neatly around a spool.

The chambered storage unit is both physically and operatively linkable to the main body of the equipment -that is to say, it is not just mounted on the equipment, it actually forms an operative (electronic/electrical) connection to the equipment so that the speaker/ microphone lead can be operatively connected to and through the unit to the equipment itself. The means providing this operative link is conveniently of a simple plug-and-socket form; many mobile phones, dictating machines and personal players already include built-in sockets for accessories such as external microphones and earpieces, and therefore the storage unit most preferably is provided with a matching plug forming a through connection for the relevant lead. Most conveniently, indeed, this plug can also be the means by which the unit is physically linked to the equipment (though, as noted above, the physical attachment of the storage unit can also be effected in other, or additional, ways, such as by using a VELCRO (RTM) strip to bind a mobile phone to a storage unit disposed within the phone's case).

In the case of many items of personal audio equipment, an external microphone or earpiece is an alternative to the internal microphone or speaker of the equipment. The invention facilitates switching between use of the equipment's internal transducers

and the external transducers. Preferably the switching mechanism whereby the invention is activated is housed within the storage unit, in order to facilitate the dual use of the equipment to which it is linked, that is to say it can be used as it is designed without physically removing the link to the invention, and can be said to be integrated with the equipment. The tidy of the invention is a storage unit which preferably include a cable, or lead, by which the relevant equipment is operatively connectable, through the storage unit, to the associated speaker and/or microphone. Firstly, the lead can take any suitable physical form, and be of any appropriate length. For earpieces and microphones, for example, the lead might be a twisted pair of thin insulated wires 3 to 4ft (about 90 to 120cm) long; for stereo headphones it might be two double side-by-side wires. Basically, the cable should be of a stiffness that allows it to coil within the chamber without knotting but thin enough to minimise the size of the chamber holding it.

Secondly, the lead is operatively connectable through the storage unit to its associated equipment -and most conveniently this is an integral (rather than an unpluggable) connection internal of the unit's chamber and to and through the means by which the unit itself can be connected to the equipment.

The invention's cable , or lead, is storable in the chamber, and is associated with means to allow it to be pulled out for use and then withdrawn/ retracted back inside after that use is completed. The means, which are most conveniently located within the chamber in the storage unit, may take a number of widely different forms; one possibility is a spool onto which the cable is wound, perhaps by hand - the storage unit could be provided with a small (foldable) hand crank appropriately linked to the shaft on which the spool is mounted - but most preferably driven by the stored energy in a constant tension spring, as is described further hereinafter with reference to the accompanying Drawings. The form of retraction means presently favoured is a pair of pinch rollers (between which the lead passes) that can be suitably wound to pull the lead back into the unit's chamber. Again, these rollers could be wound by hand -using a small hand crank appropriately linked to the rollers - but again most preferably they are in some way "motor" driven, in particular by a constant tension spring means. As is described further hereinafter with reference to the accompanying Drawings, in one embodiment the rollers are driven by a small electric motor. In these several

motor-driven cases, an alternative drive means is a spring-loaded ratcheted clockwork train, either key-wound or, more conveniently, wound by the very action of pulling the lead out (rather like a conventional spring-driven measuring tape).

When employing an electric motor to drive the retraction arrangement, most preferably - and as described hereinafter - the storage unit includes means to detect when the cable is fully retracted, and then to limit the power to the motor so as to prevent possible damage being incurred by the cable or retraction mechanism.

In the fully-retracted, stored state the cable tidy of the invention has the speaker /microphone adjacent thereto. Most preferably the storage unit has, or is shaped so as to provide, an external socket, or storage location, which is furnished with a retaining clip or receiving container, into which location the speaker/microphone fits neatly with a snap action so as to resist becoming separated therefrom accidentally.

For ease of use, it is preferred that a storage unit of the invention for use with a mobile phone be provided with switch means that can be operated and deactivated by the withdrawal or retraction of the cable, and allows the equipment and transducers to be switched between normal (utilising the speaker/microphone provided inside the phone) or hands-free operation (using the unit of this invention) without removing any plugs. [The socket reduces the need continually to plug in and unplug connectors, increasing the unit's useful life, and ensure the continued integrity of the connection.]

In one embodiment the cable is not an integral part of the receptacle or tidy, and the receptacle is used to accommodate the cable supplied with the equipment. In this case the cable will usually have to be initially loaded into the receptacle, and can thereafter be pulled out and retracted into the receptacle in use. In such as case the switch means may be interposed between the equipment's audio outlet and the usual termination of the cable, or the receptacle may be provided with an alternative switch means which will operate on the equipment.

The storage unit - the chamber and housing for the retracted cable and for the retraction means and the drive mechanism associated therewith - is preferably made of thin-walled plastic, of light weight, high strength and stiffness. A typical such material is ABS (acrylonitrile butadiene styrene).

Embodiments of the invention are now described, though by way of illustration only, with reference to the accompanying diagrammatic Drawings in which:

Figure 1 shows a perspective view from above and one side of a storage unit of the invention for use with a mobile phone;

Figure 2 shows a circuit diagram for a drivemotor control system suitable for use with the unit of Figure 1; and

Figures 3a/b show internal view of the unit of Figure 1, viewed respectively. from above and from the side.

Figure 4, 5 and 6 show views in plan and elevation of the exterior of a receptacle in accordance with the invention.

Figure 7 shows a schematic cross section of a receptacle in accordance with the invention, showing the lead in, spool and schematic constant tension spring arrangement.

Figures 8 and 9 show details of the ratcheting mechanism used in one embodiment of the invention.

Figure 1 shows the outside of the storage unit (generally 11), where it connects (at 1) to a mobile phone (2), retraction and on/off switches (4 and 5), the extended cable (12) with its combined earpiece and microphone (3), and the earpiece/microphone holder (6).

The unit 11 is a hollow box-like container large enough to store the entire length of the cable 12. It bears a connector 1 to connect to the mobile phone 2 (this connector will be different for most makes of phones, since there is no standard connector used between mobile phone manufacturers). A combined earphone/microphone 3 is attached to the cable 12 which retracts into the unit when the push button switch 4 on the side of the unit is pressed. The second switch on the side of the unit, a slide switch 5, is used for turning the unit on/off, which the unit to be switched off, without the need to remove the connector 1 from the mobile phone 2.

If a call is received on the user's mobile phone, he (or she) can pull out the earpiece 3 and extend it up to his ear, and the call can then proceed. When finished, the earpiece 3 can be removed from the ear, and the retraction button 4 depressed until the cable 12 is fully rewound into the unit, with the earpiece 3 placed in its holder 6.

The unit's dimensions are 55mm wide, 45mm high, 20mm deep (about 2x1.8x0.8in), and the fully extended cable length is 900mm (about) long.

Figure 2 shows the circuit diagram required to operate the motor (8: see Figure 3) for retraction, prevent overwinding of the cable 12, and prevent damage to the motor 8, due to a fault condition, ie. if the cable gets caught on something. Power is to be sourced from the phone's battery (not shown) via the connector 1.

Figure 3 shows the inside of the unit 11, where the retraction means can be seen. This consists of two pinch rollers (7) on top of each other, one driven by the small DC motor 8. Within the unit 11 is the chamber 9 in which is stored the cable 12. The cable is permanently located between the two pinch rollers 7, so when the motor 8 spins the cable will be drawn into the storage chamber 9 - provided, of course, that the motor has not stopped due to a fault condition. In the corner of the chamber 9 is a jack-plug socket connector (13), and adjacent that is a small chip package (14) containing the circuitry of Figure 2.

A specific embodiment of the invention is now be described by way of example with reference to the accompanying drawings in which Figures 4, 5 and 6 show external features and Figure 4 and 5 show internal features of the unit.

The receptacle comprises the outer casing top view in Figure 4 and two side views Figures 5 and 6. The main body and cable storage area 21 has an overall diameter of about 40mm. The horn shape 22 allows for storage of the microphone casing which is attached to the retractable cable. This can be seen in 23, the diameter is about 15mm. The depth of the main body of the unit 24 is about 10mm, around the outside is a groove to allow for any remaining cable from the earpiece to the microphone to wrap around the casing once the cable is fully retracted. Figure 6 is showing the side of the microphone housing 25.

Figures 7 and 8 show the internal components of the unit, 26 is the electrical connection point (which is fixed with respect to the casing) for the cable connected to the mobile phone. Underneath this is the moving wheel 32 which spools the cable, between 26 and 32 are electrical contacts.

The wheel 32 is fixed to the tension spring 31 which the centre of it is attached to the casing.

Included on the wheel 32 are small cut-outs which with 29 form a ratchet mechanism and therefore when button 29 is in its default position the wheel 32 can only turn in one direction (anti-clockwise). As the cable 30 is pulled away from the unit the spring 31 tenses up, as the cable 30 is released 34 the wheel 32 will attempt to turn clockwise but is prevented from doing so by 29. By sliding the button 29 upwards will unlock the wheel 32 and commence cable retraction.

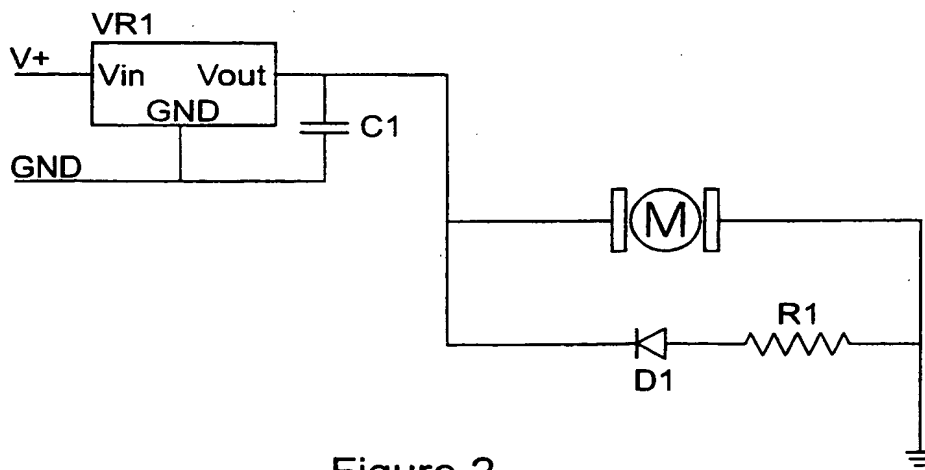
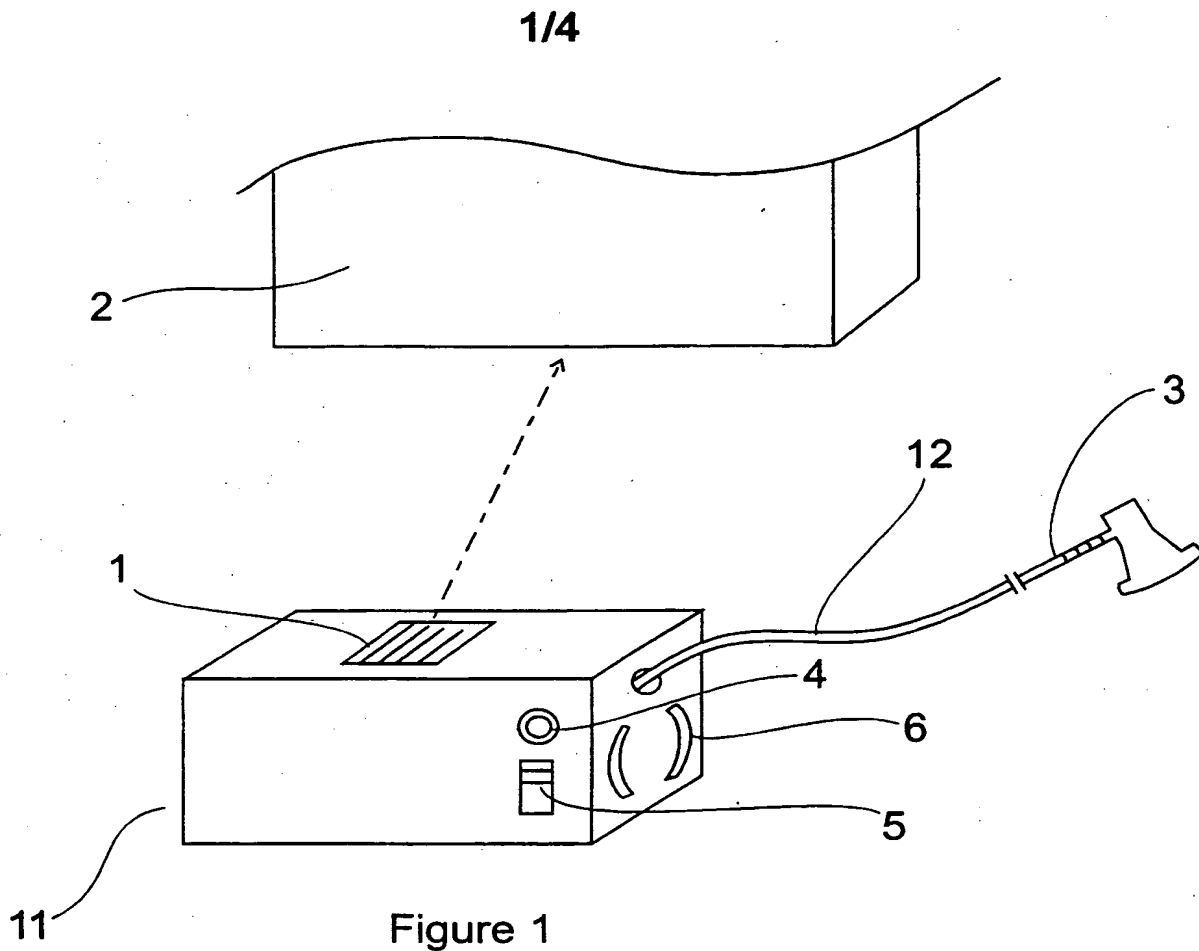
The reference 27 in Figure 7 is a microswitch, it is used to detect the position of the cable 30 (i.e. when the unit is in use) so the action of pulling out the earpiece closes the electrical connection and enables the unit. The inverse effect is achieved when 19 is pressed and the microphone 30 is stored back into its housing.

CLAIMS

1. A cable receptacle for accommodating electrical cable linking one or more personal acoustic transducers to portable electronic audio equipment electrically connectable through the cable to such transducers in which the receptacle is physically secured or adapted to be secured to the audio equipment, and in which the receptacle is designed so as to permit withdrawal of the cable from and retraction of the cable into the receptacle, characterised in that the receptacle also comprises switch means for controlling the interaction of the audio equipment with the acoustic transducers.
2. A receptacle as claimed in Claim 1 in which the switch is a switch operated automatically on withdrawal of cable and/or retraction of cable.
3. A receptacle as claimed in either of the preceding Claims in which the personal acoustic transducers comprise one or more earphones, headphones, and/or microphone designed for single person use
4. A receptacle as claimed in any of the preceding Claims in which the portable electronic equipment is personal stereo or handheld mobile telephone which provides an audio (analogue or digital) signal to the transducers and/or receives audio (analogue or digital) signal from the transducers
5. A receptacle as claimed in any of the preceding Claims in which the switch connects external transducers and disconnects external transducers
6. A receptacle as claimed in any of Claims 1-4 which turns on/off or powers up/down the audio equipment
7. A receptacle as claimed in any of the preceding Claims, for use with a handheld mobile telephone.

8. A receptacle as claimed in any of the preceding Claims, which receptacle is a separate suitably-sized and -shaped box, or similar container, with a suitable opening through which the lead can pass, within which box the lead can be stored, and is physically mounted on the equipment utilising a secure plug/socket insertion arrangement that will prevent accidental disengagement.
9. A receptacle as claimed in any of the preceding Claims, which receptacle is operatively (and physically) linkable to the main body of the equipment by means which is of a simple plug-and-socket form.
10. A receptacle as claimed in any of the preceding Claims, which receptacle is mounted within a case into which the equipment can be secured.
11. A receptacle as claimed in Claim 9, which receptacle is mounted by way of studs, poppers or VELCRO-type strips.
12. A receptacle as claimed in any of Claims 1 and 7 which receptacle is physically integral with the main body of the equipment.
13. A receptacle as claimed in Claim 12 whereby the receptacle is concealed in the body of the equipment, with just the speaker and microphone external to the equipment.
14. A receptacle as claimed in any of the preceding Claims, wherein the cable by which the relevant equipment is operatively connectable, through the storage receptacle, to the associated transducer is so connected by an integral connection internal of the receptacle and to and through the means by which the receptacle itself can be connected to the equipment.
15. A receptacle as claimed in any of the preceding Claims, wherein the means to allow the lead to be pulled out for use and then retracted back inside after that use is completed, is located within the receptacle, and is a pair of pinch rollers (between which the lead passes) that can be suitably wound to pull the lead back into the receptacle.

16. A receptacle as claimed in any of Claims 1 to 14, wherein the means to allow the lead to be pulled out for use and then retracted back inside after that use is completed, is located within the chamber in the storage receptacle, and is a spool that can be suitably wound to pull the lead back into the receptacle.
17. A receptacle as claimed in any of the preceding claims, wherein the receptacle includes an electrical powered motor for drivably retracting the cable and means to detect when the cable is fully retracted, and then to limit the power to the motor.
18. A receptacle as claimed in any of the preceding claims, wherein the receptacle includes a constant tension spring means for retracting the cable.
19. A receptacle as claimed in any of the preceding Claims, which receptacle has, or is shaped so as to provide, an external socket, or storage location, which is furnished with a retaining clip, into which location the speaker microphone fits neatly with a snap action so as to resist becoming separated therefrom accidentally.
20. A receptacle as claimed in any of the preceding Claims and substantially as described hereinbefore.



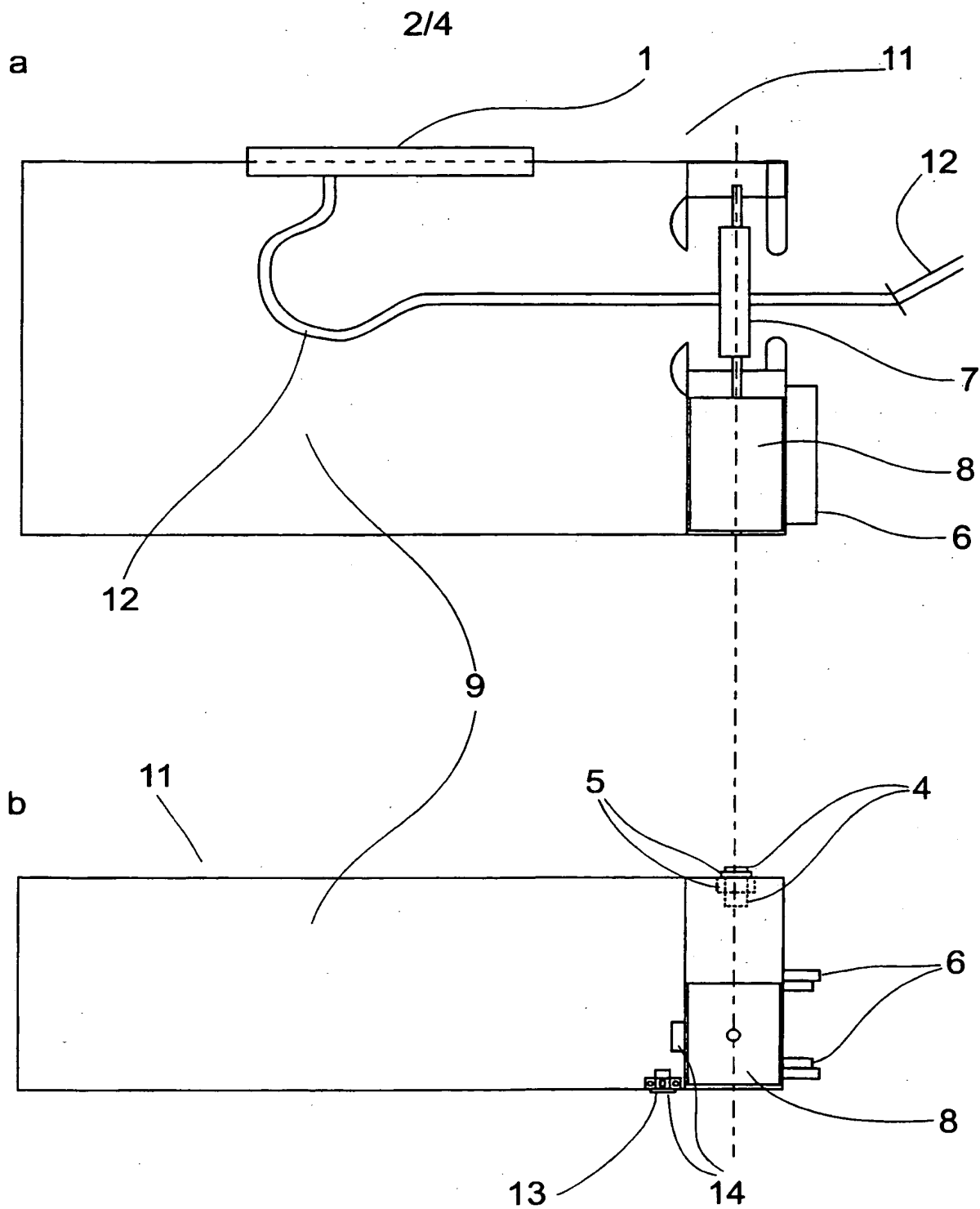


Figure 3

3/4

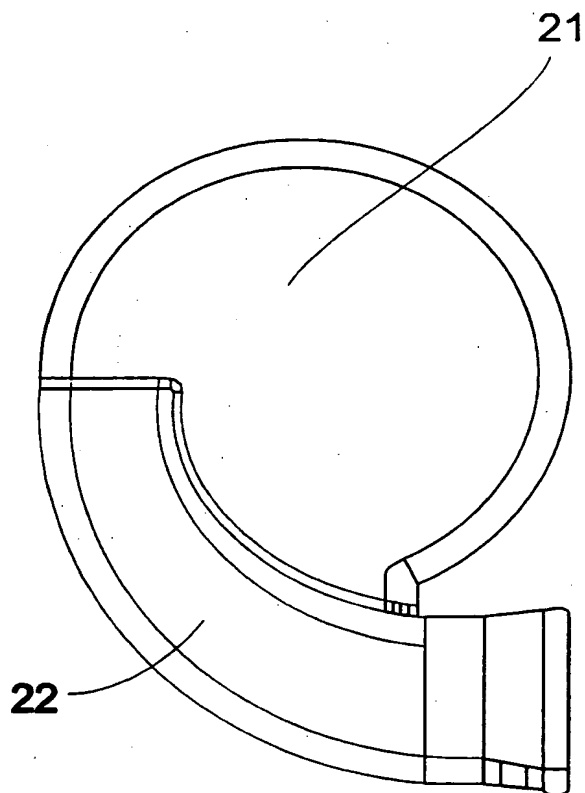


Figure 4

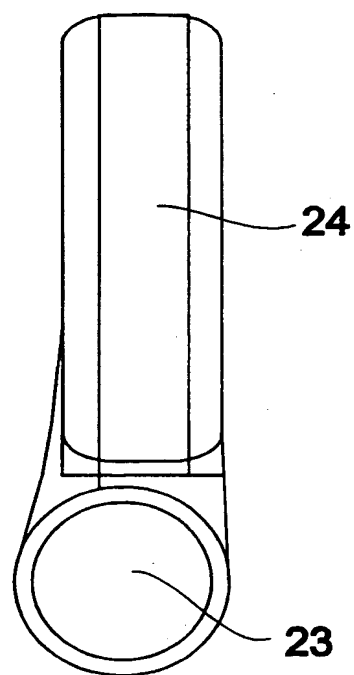


Figure 5

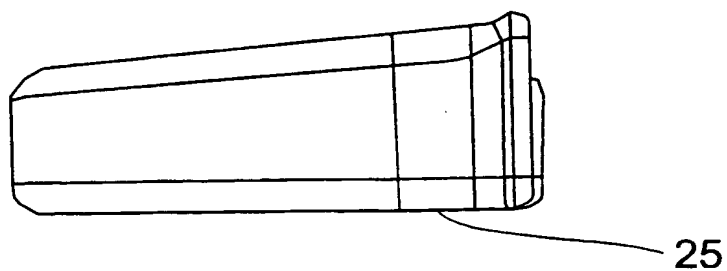


Figure 6

4/4

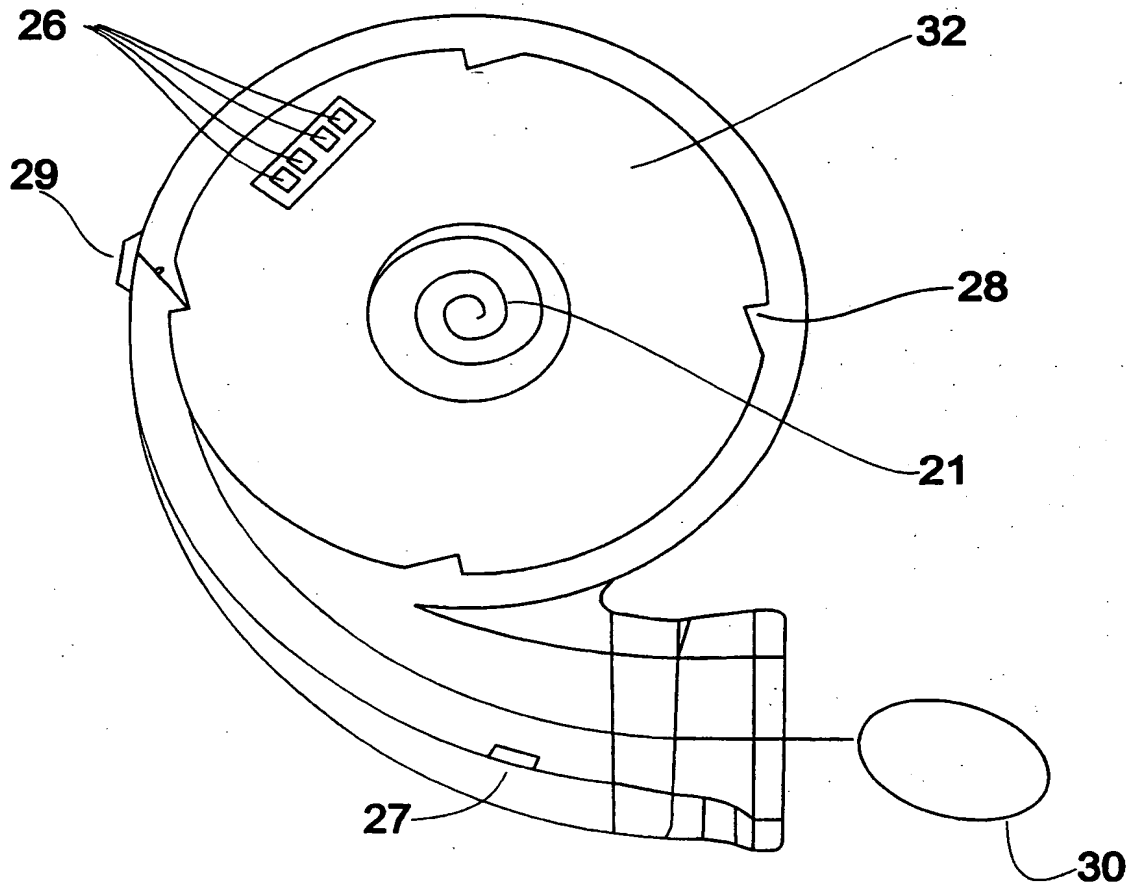


Figure 7

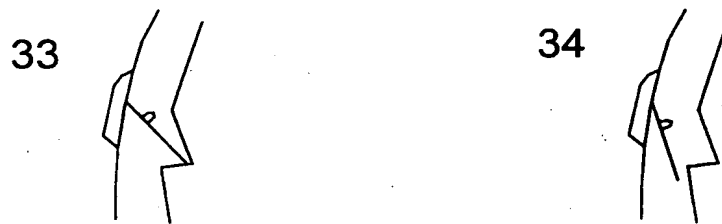


Figure 8

INTERNATIONAL SEARCH REPORT

Inte: onal Application No

PCT/GB 00/02730

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H04M1/15 H04M1/60 H04B1/38 H02G11/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 331 889 A (NIPPON ELECTRIC CO) 2 June 1999 (1999-06-02)	1-5, 7, 10-14, 19, 20
A	abstract page 3, line 22 -page 12, line 8 figure 2	6, 8, 9, 15-18
X	US 5 724 667 A (FURUNO HIROSHI) 3 March 1998 (1998-03-03)	1-4, 7, 10-16, 18-20
A	abstract column 1, line 60 -column 4, line 6 column 8, line 5 - line 16 figure 1 figure 2 figure 3	5, 6, 8, 9, 17
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

8 November 2000

Date of mailing of the international search report

16/11/2000

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Lindhardt, U

INTERNATIONAL SEARCH REPORT

Inter nal Application No

PCT/GB 00/02730

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US 5 832 098 A (CHEN TONNY) 3 November 1998 (1998-11-03)</p> <p>the whole document</p>	<p>1,3-5, 7-11,14, 16,19,20</p>
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